4.6 SUMMARY OF IMPACTS

The reasonable action alternatives analyzed in the PEIS are this Preferred Alternative, three long-term storage alternatives, and nine disposition alternatives (3 categories). The long-term storage alternatives, the disposition by immobilization alternative, and the Preferred Alternative all have suboptions or variants. In addition to these alternatives, the No Action Alternative has been analyzed for storage and disposition. The potential environmental impacts described in the following sections represent the impacts resulting from each alternative. Detailed explanations and the supporting data for the statements made and conclusions drawn are contained in Sections 4.1 through 4.5.

4.6.1 PREFERRED ALTERNATIVE IMPACTS

The Department's Preferred Alternative for storage and disposition is shown in Table 4.6.1–1. For long-term storage, DOE's Preferred Alternative is a combination of No Action, upgrade, and phaseout for the various DOE sites. For disposition of surplus Pu, the Preferred Alternative is a combination of reactor and immobilization alternatives.

Table 4.6.1–1. Storage and Disposition Actions at Department of Energy Sites Proposed by the Preferred Alternative

Action	Hanford	NTS	INEL	Pantex	ORR	SRS	RFETS	LANL
Storage								
No Action	X[a]	X[b]	X[a]					X[a]
Upgrade				X[c]	X[d]	X[e]		
Phaseout							X	
Disposition[f]								
Pit disassembly/conversion	X		X	X		X		
MOX fuel fabrication	X		X	X		X		
Pu conversion	X					X		
Immobilization	X					X		

[a] Pending subsequent tiered NEPA analysis for disposition of surplus Pu at these sites.

[b] NTS does not currently store either Pu or HEU.

[c] For storage of those pits currently at Pantex, pits from RFETS, and strategic reserve pits only.

[d] For storage of HEU only.

[e] For storage of only those Pu materials currently at SRS and non-pit Pu materials from RFETS.

[f] "X" denotes potential sites for locating the disposition facilities pending subsequent tiered NEPA decisions. Only one of each facility is needed for accomplishing the disposition mission.

Impacts from Storage Actions Under the Preferred Alternative

The Department's Preferred Alternative for the long-term storage of surplus Pu is a combination of No Action, upgrade, and phaseout for the various DOE sites. Table 4.6.1–2 shows the incremental operation requirements, public health risk, and waste generation that would result from the storage actions under the Preferred Alternative.

Land Resources. The implementation of the storage actions under the Preferred Alternative would have no additional impact to land resources and visual resources at all sites except Pantex. The upgrade actions at Pantex would require 0.1 ha (0.25 acre) of land. The amount of land required is a very small portion of the land available for development at the site. The proposed upgrade would be consistent with current and future land-use plans for the site.

Table 4.6.1–2. Incremental Impact Indicators Over No Action From the Annual Operation of the Storage Actions Under the Preferred Alternative

	Hanford No Action	NTS No Action	INEL No Action	Pantex Upgrade[a]	ORR Upgrade	SRS Upgrade[b]	RFETS Phaseout	LANL No Action
Land area used (ha)	0	0	0	0.1	0	0	0	0
Water usage (MLY)	0	0	0	27.5	3	7.1	0	0
Maximum direct employment	0	0	0	90	111	130	-2179	0
Risk of fatal cancer for MEI from lifetime operation	0	0	0	4.5×10^{-13}	5.5×10^{-13}	2.1×10^{-10}	0	0
Solid TRU waste (m^3/yr)	0	0	0	0.8	0	0	0	0
Solid low-level waste (m^3/yr)	0	0	0	138	3	0	0	0
Solid hazardous waste (m^3/yr)	0	0	0	1.5	0.8[c]	0.8	0	0

[a] With RFETS pits.
[b] With RFETS non-pit materials.
[c] Data includes mixed LLW.

Site Infrastructure. The infrastructure at Pantex, ORR, and SRS would be capable of supporting the storage actions under the Preferred Alternative without major modifications. Any minor infrastructure modifications would have negligible impacts at these sites because they would most likely follow existing infrastructure base and rights-of-way.

Air Quality and Noise. Implementing the Preferred Alternative storage action at Pantex, ORR, and SRS would result in short-term air quality impacts during construction and negligible air quality impacts during operation. Modeled air emissions concentrations within applicable Federal, State, and local air quality standards and guidelines. Noise impacts would be negligible at all sites during construction and operation.

Water Resources. At Pantex, all water requirements for the upgrade would be supplied from existing onsite groundwater production wells. The construction and operation of the Upgrade Alternative would contribute to the continued depletion of the Ogallala Aquifer. Surface and groundwater resources at ORR and SRS are adequate to meet the additional requirements of the Preferred Alternative. Water resource impacts at ORR and SRS would be negligible.

Geology and Soils. The construction and operation of the storage actions under the Preferred Alternative would involve some ground disturbing activities with potential for soil erosion at Pantex and SRS. Using standard construction and erosion control measures soil impacts would be negligible. No other apparent direct or indirect effects on geologic resources are anticipated at any of the other DOE sites.

Biological Resources. Construction and operation of the storage actions under the Preferred Alternative would cause minimal disturbance to biological resources at Pantex, ORR, and SRS. All construction and operation activities would take place within an area that was previously disturbed. Minimal impacts to biological resources are expected at any of the other DOE sites as a result of the Preferred Alternative.

Cultural and Paleontological Resources. At Pantex, determinations of NRHP-eligible Cold War Era structures have not yet been completed, but none of the structures that would be modified under the Upgrade Alternative are currently considered NRHP eligible. At ORR, four buildings that are part of the proposed Y–12 Plant

National Register Historic District would be modified under the Preferred Alternative. The Preferred Alternative would not be expected to impact cultural and Paleontological resources at the rest of the DOE sites.

Socioeconomics. At Pantex and SRS, the upgrade would require a small number of additional workers for construction and operation. The small increase in employment would have negligible impact to the regional economy. At RFETS, phaseout of Pu storage would result in the loss of 2,197 direct jobs. Compared to the total employment in the area, the loss of these jobs and the impacts to the regional economy would not be severe. Minimal socioeconomic impacts are expected at the other DOE sites as a result of the Preferred Alternative.

Public and Occupational Health and Safety. The Upgrade Alternative under the Preferred Alternative would increase the amount of Pu stored at Pantex and SRS; increased doses to the public would be negligible. At ORR, doses to the public from upgraded storage would be virtually the same as for storage under No Action. At RFETS, the phaseout of Pu storage would reduce the impacts from radiological and chemical releases and exposure to levels slightly below the No Action levels for normal operations. Stabilization and packaging activities at RFETS would have short-term minor increases in exposure to workers associated with the transport of the Pu. The potential worker exposures would not exceed applicable health and safety regulatory standards. No impacts are expected at the other DOE sites as a result of the Preferred Alternative.

Waste Management. The construction and operation of the storage actions under the Preferred Alternative at Pantex, ORR, and SRS would have an impact on existing waste management activities. Additional wastewater and nonhazardous and hazardous solid waste would be generated at these sites. Hazardous waste would be shipped offsite to a commercial RCRA-permitted treatment and disposal facility. Existing waste handling practices would be used for additional nonhazardous wastes from the new facilities. No waste management impacts are expected at the other DOE sites as a result of the storage action under the Preferred Alternative.

Environmental Justice. The air emissions and hazardous chemical and radiological emissions from normal operations of the storage actions under the Preferred Alternative would be within regulatory limits at all sites. Therefore, there would be no disproportionate impacts to any low income or minority populations at any of the site's due to normal operations. The public health and safety analyses show that air emissions and hazardous chemical and radiological releases from normal operations for the Preferred Alternative storage facilities would be within regulatory limits and that no latent cancer fatalities would result. Because no populations within 80 km (50 mi) of the proposed site would experience high or adverse health or environmental impacts, neither minority populations nor low-income populations would experience disproportionate high and adverse human health or environmental impacts.

The public health and safety analyses also indicate that radiological releases from accidents would not result in significant adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations. Potential transportation accidents would be random events along the transportation corridors, therefore, such accidents would not disproportionately impact minority or low income populations.

Intersite Transportation. Potential intersite transportation impacts could occur for transportation of RFETS material to Pantex and because of the small increased risk of traffic accident fatalities. Intersite transportation impacts would primarily be the result of nonradiological impacts such as fatalities from nonradiological highway accidents. The total potential fatalities from the transportation of material under the Preferred Alternative would be 0.006 for Pantex and 0.06 for SRS.

Impacts from Storage and Disposition Actions Under the Preferred Alternative

This section identifies the maximum site impacts that would result at Hanford, INEL, Pantex, and SRS from combining the Preferred Alternative for storage with the Preferred Alternative for disposition at each site. Total site impacts associated with No Action for NTS and LANL, and with phaseout at RFETS, are described in

Section 4.2. The impacts from operating most of the existing reactors would not affect DOE sites and are described in Section 4.3.5. To the extent practical, DOE would use existing buildings and facilities for portions of the disposition activities. The use of existing buildings would reduce the impacts identified in this section. DOE would analyze and compare existing and new buildings for the technologies chosen as part of the Preferred Alternative in subsequent, tiered NEPA reviews.

The preferred strategy for disposition is a combination of reactor and immobilization alternatives. For purposes of analysis, approximately 70 percent of the surplus Pu, which is high purity material, would be converted into MOX fuel for use in nuclear reactors. The Preferred Alternative identifies the use of existing reactors. The Department would retain using MOX fuel in Canadian CANDU reactors in the event of a multilateral agreement among Russia, Canada, and the United States. Low purity Pu would be immobilized in glass or ceramic forms (approximately 30 percent for analysis purposes only). Disposition by use in reactors would require the construction of a MOX fuel fabrication facility and a pit disassembly/conversion facility at a DOE site. Disposition by immobilization would require the construction of a Pu conversion facility and an immobilization facility (either ceramic immobilization or vitrification) at a DOE site. DOE has identified four DOE sites in Table 4.6.1–1 as potential locations for MOX fuel fabrication and pit disassembly/conversion facilities, and two sites for the Pu conversion and immobilization facilities.

The following sections describe the total impacts that would result from the implementation of the Storage and Disposition Program Preferred Alternative at the four DOE sites identified for potential placement of the disposition facilities. The analysis conservatively assumed a maximum impact scenario where two or four disposition facilities could be placed at the same DOE site as shown in Table 4.6.1–1. For immobilization, the analysis conservatively uses impacts from the ceramic immobilization facility since they are generally larger than the impacts from the vitrification facility.

Land Resources. The land-use requirements associated with construction and operation of the Preferred Alternative actions at Hanford, INEL, Pantex, and SRS are shown in Table 4.6.1–3. The requirements shown in Table 4.6.1–3 are the maximum impacts if multiple disposition facilities were located at the same site. Collocating the disposition facilities at a site would likely reduce the amount of land-use impacts due to the sharing of land resources. In addition, optimal use of existing buildings and facilities would occur where possible. All four sites would have adequate land area to accommodate the facilities. Most disposition facilities would be sited in a 1.6-km (1-mi) buffer zone contained within the site boundary. This section describes the impacts to land resources from constructing and operating the Preferred Alternative storage and disposition facilities for each site.

For all four DOE sites, construction and operation would not affect other onsite or offsite land uses. No prime farmlands exist onsite. Construction and operation would be compatible with State and local land-use plans, policies, and controls. Hanford provides information to local jurisdictions for use in their efforts to comply with the GMA.

Hanford Site. Plutonium materials would continue to be stored at the PFP in the 200 West Area, pending decisions on their disposition. No impacts to land-use or visual resources are expected. The pit disassembly/conversion, Pu conversion, ceramic immobilization, and MOX facilities would be located on vacant land in the 200 Area adjacent to 200 East. Construction and operation of the facilities would conform to existing and future land use as described in the *Hanford Site Development Plan* and with ongoing discussions in the comprehensive land-use planning process. According to the *Hanford Site Development Plan*, 200 Area land use is identified as waste operations, which includes radioactive material management, processing, and storage.

Construction and operation would be consistent with the industrialized landscape character of the 200 Area and with the current VRM Class 5 designation. A potential source of visual impacts during operation of the ceramic immobilization facility or MOX facility would be the stack plumes that could be visible from public viewpoints

Table 4.6.1–3. Land-Use Requirements From the Preferred Alternative

Action	Area of Disturbance (ha)			
	Hanford	INEL	Pantex	SRS
Construction				
Storage	0.0	0.0	0.18	0.0
Pit disassembly/conversion	14	14	14	14
Pu conversion	36	NA	NA	36
MOX fuel fabrication	121	121	121	121
Ceramic immobilization	20	NA	NA	20
Total (Maximum Impact)	191	135	135.18	191
Operation				
Storage	0.0	0.0	0.1	0.0
Pit disassembly/conversion	12	12	12	12
Pu conversion	28	NA	NA	28
MOX fuel fabrication	81	81	81	81
Ceramic immobilization	12	NA	NA	12
Total (Maximum Impact)	133	93	93.1	133

Note: NA=not applicable.

Source: Section 4.2.1.1; Section 4.2.3.1; Section 4.3.4.1; Section 4.2.6.1; Section 4.3.1.1; Section 4.3.2.1; Section 4.3.4.2.1; Section 4.3.5.1.1.

with high sensitivity levels, including State Highways 24 and 240 and the city of Richland; however, the proposal would be compatible with the existing industrial character of the area.

Idaho National Engineering Laboratory. Pu materials would continue to be stored at the ICPP and at ANL-W in the ZPPR and FMF vaults, pending decisions on their disposition. No impacts to land-use or visual resources are expected. The pit disassembly/conversion and MOX facilities would be located on undeveloped land within or near the ICPP security area. Construction and operation would be consistent with the *Idaho National Engineering Laboratory Site Development Plan*, which designates the ICPP as situated within the central core area/Prime Development Zone at INEL.

Construction and operation would be consistent with the industrialized landscape character of the ICPP and with the current VRM Class 5 designation. A potential source of visual impact during operation of the MOX facility would be from the stack plumes that could be visible; however, the proposal would be compatible with the existing industrial character of the area.

Pantex Plant. Buildings 12-66 and 12-82 in Zone 12 South would be modified to accommodate the long-term storage of Pantex Pu material and RFETS pit Pu material for the storage Preferred Alternative. Construction and operation would conform with the *Pantex Site Development Plan*, which includes as part of its master plan the Fissile Material Storage Facility in Zone 12. Zone 12 is also the potential location for the pit disassembly/conversion facility. Construction and operation would conform with the *Pantex Site Development Plan*, which designates Zone 12 for weapon assembly/disassembly. The MOX fuel fabrication facility would be located on undeveloped land in Zone 11, which is designated for applied technology. However, Pantex could revise the site development plan. If this change were approved, the proposed MOX facility would be in compliance, resulting in no impact.

The proposed visual environment of Zone 12 would be compatible with the existing industrialized landscape character and the current VRM Class 5 designation would remain. A potential source of visual impacts during operation of the MOX facility in Zone 11 would be the stack plumes that could be visible; however, the proposal would be compatible with the existing industrial character of the area.

Savannah River Site. The APSF in F-Area would be modified to accommodate the long-term storage of SRS non-pit Pu material and RFETS non-pit Pu material for the Preferred Alternative. Vacant land in the F-Area would be used for the pit disassembly/conversion, Pu conversion, and ceramic immobilization facilities. Construction and operation would conform with existing and future land use as designated by the *Savannah River Site Development Plan*. According to the Plan, current F-Area land use is designated industrial operations, while the future land-use category is primary industrial mission. The MOX fuel fabrication facility would be located on undeveloped land approximately 1.6 km (1 mi) north of the P-Reactor Area on the east side of SRS Route F. Construction and operation would conform with future land use as designated by the *Savannah River Site Development Plan*. According to the Plan, the future land-use category for the proposed development site is primary industrial mission. Although the proposal would convert undeveloped land, forested land, and a very small portion of NERP lands, due to conformance of the proposed MOX fuel fabrication facility would conform with site land-use plans.

Construction and operation of the upgrade storage, pit disassembly/conversion, Pu conversion, and ceramic immobilization facilities would be consistent with the industrial landscape character and current VRM Class 5 designation of the F-Area. Construction and operation of the MOX facility would change the current VRM Class 4 designation of the site north of the P-Reactor Area to Class 5. Potential visual impacts could occur during operation of the ceramic immobilization and MOX facilities from additional stack plumes; however, because of hilly terrain, visual effects to public access roads with high sensitivity levels would not occur.

Site Infrastructure. The resource requirements for the construction of the proposed facilities are not expected to exceed site capabilities. Operational requirements from the Preferred Alternative at all sites analyzed are shown in Table 4.6.1–4. The planned facilities use natural gas as the primary utility fuel, and the total requirement for natural gas would be larger than currently available at Hanford, INEL, and SRS. Since INEL and SRS use fuel oil as the primary utility fuel, use of natural gas in lieu of fuel oil would require additional infrastructure. Final designs for facilities under the Preferred Alternative at INEL and SRS would be adapted to use fuel oil. Additional oil and natural gas requirements could be procured through normal contractual means at all sites. Locating the Preferred Alternative disposition actions at any of the analyzed sites would require the construction of additional roads and rail.

Air Quality and Noise. Construction and operation of the proposed facilities under the Preferred Alternative would generate criteria and toxic/hazardous air pollutants. To evaluate potential air quality impacts at Hanford, INEL, Pantex, and SRS, potential concentrations from the facilities have been compared to Federal and State guidelines in Table 4.6.1–5.

Concentrations of PM_{10} and TSP are expected to increase during construction of the facilities. Simultaneous construction of the facilities could result in elevated levels of these pollutants. However, appropriate control measures would be used to control fugitive emissions. It is expected that the sites would typically comply with applicable Federal and State ambient air quality standards during construction.

The PSD regulations, which are designed to protect ambient air quality in attainment areas, apply to new sources and major modification to existing sources. Based on emission rates presented in Appendix F, PSD permits may be required at all of the sites under consideration for the preferred alternative facilities. PSD permits may require inclusion of "offsets" (reductions of existing emissions) for any additional or new emission source.

During operation, concentrations of criteria and toxic/hazardous air pollutants are expected to be in compliance with Federal, State, and local air quality regulations and guidelines at all of the sites analyzed. The estimated pollutant concentrations for the preferred alternative facilities, plus the No Action concentrations, are presented in Table 4.6.1–5.

Noise sources associated with the preferred alternative facilities may include construction equipment, increased traffic, ventilation equipment, cooling systems, and emergency diesel generators. The contribution to offsite

noise levels would continue to be small at all of the sites because the facilities associated with the Preferred Alternative would be a sufficient distance away from the site boundary and sensitive receptors. Due to the size of the sites, noise emissions from construction and operation activities would not be expected to cause annoyance to the public. Some noise sources may result in the disturbance of wildlife.

Water Resources. The construction and operation of the proposed facilities under the Preferred Alternative would affect water resources. Table 4.6.1–6 shows the estimated water usage and wastewater generation from the Preferred Alternative at Hanford, INEL, Pantex, and SRS. All facilities would be constructed outside of the 100-year, 500-year, and probable maximum floodplain; although, where the 500-year floodplain is not completely mapped at SRS, the facility would likely be located outside of the 500-year floodplain. Flooding from dam failures and flooding from a landslide resulting in river blockage are not expected to occur where applicable. The wastewater discharges are expected to continue to meet NPDES limits and reporting requirements at all sites.

Hanford Site. Surface water obtained from the Columbia River would be used as the water source for operation of the proposed facilities. The total water requirement for the Preferred Alternative at Hanford would be less than 1 percent of the Columbia River's average annual flow (3,360 m^3/s [118,642 ft^3/s]). The withdrawals are minor in comparison with the average flow of the river and would not noticeably affect the local or regional water supply.

Table 4.6.1–6. Potential Changes to Water Resources Resulting From the Preferred Alternative

Affected Resource Indicator	Hanford	INEL	Pantex	SRS
Water Source	Surface	Ground	Ground	Ground
No Action water requirement (million l/yr)	13,511	7,570	249	13,247
No Action wastewater discharges (million l/yr)	246	540	141	700
Construction				
Water availability and use				
Total water requirement (million l/yr)	44.2	3.8	3.86	47.2
Storage alternative (million l/yr)	0[a]	0[a]	0.06[b]	3[c]
Pit disassembly/conversion facility (million l/yr)	1.9	1.9	1.9	1.9
Plutonium conversion facility (million l/yr)	2.4	NA	NA	2.4
MOX fuel fabrication facility (million l/yr)	1.9	1.9	1.9	1.9
Ceramic immobilization alternative (million l/yr)	38	NA	NA	38
Percent increase in projected water use[d]	0.33	0.05	1.55	0.36
Water quality				
Total wastewater discharge (million l/yr)	35	3.8	6.9	37.4
Storage alternative (million l/yr)	0[a]	0[a]	3.1[b]	2.4[c]
Pit disassembly/conversion facility (million l/yr)	1.9	1.9	1.9	1.9
Plutonium conversion facility (million l/yr)	2.4	NA	NA	2.4
MOX fuel fabrication facility (million l/yr)	1.9	1.9	1.9	1.9
Ceramic immobilization alternative (million l/yr)	28.8	NA	NA	28.8
Percent increase in wastewater discharge[e]	14.23	0.70	4.89	5.34
Percent increase in stream flow	neg	NA	NA	0.74[f]
Operation				
Water availability and use				
Total water requirement (million l/yr)	481.9	151.4	178.9	489
Storage alternative (million l/yr)	0[a]	0[a]	27.5[b]	7.1[c]
Pit disassembly/conversion facility (million l/yr)	94.6	94.6	94.6	94.6
Plutonium conversion facility (million l/yr)	80.5	NA	NA	80.5
MOX fuel fabrication facility (million l/yr)	56.8	56.8	56.8	56.8
Ceramic immobilization alternative (million l/yr)	250	NA	NA	250

Table 4.6.1–6. Potential Changes to Water Resources Resulting From the Preferred Alternative—Continued

Affected Resource Indicator	Hanford	INEL	Pantex	SRS
Percent increase in projected water use[g]	3.57	2.00	71.85	3.69
Water quality				
Total wastewater discharge (million l/yr)	241.7	128.7	141.6	243.5
Storage alternative (million l/yr)	0[a]	0[a]	12.9[b]	1.8[c]
Pit disassembly/conversion facility (million l/yr)	85.2	85.2	85.2	85.2
Plutonium conversion facility (million l/yr)	15	NA	NA	15
MOX fuel fabrication facility (million l/yr)	43.5	43.5	43.5	43.5
Ceramic immobilization alternative (million l/yr)	98	NA	NA	98
Percent increase in wastewater discharge[h]	98.25	23.83	100.4	34.79
Percent increase in stream flow	neg	NA	NA	4.83[f]
Floodplain				
Is action in 100-year floodplain?	No	No	No	No
Is critical action in 500-year floodplain?	No	No	No	Unlikely

[a] Zero values indicate No Action Alternative for storage at Hanford and INEL.
[b] Value represents upgrade without RFETS and LANL material.
[c] Value represents a conservative assumption for SRS to receive all RFETS and LANL Pu material as opposed to non-pit Pu material only.
[d] Percent increases in water requirements during construction of the proposed facilities are calculated by dividing water requirements for the facility by No Action water requirements at each analyzed site.
[e] Percent increases in wastewater discharged during construction of the proposed facilities are calculated by dividing wastewater discharges for the facility by No Action discharge at each analyzed site.
[f] Percent change in stream flow from wastewater discharges is calculated from the minimum flow of the Fourmile Branch (0.16 m^3/s).
[g] Percent increases in water requirements during operation of the proposed facilities are calculated by dividing water requirements for the facilities by No Action water requirements at each analyzed site.
[h] Percent increases in wastewater discharged during operation of the proposed facilities are calculated by dividing wastewater discharges for the facilities by No Action discharge at each analyzed site.
Note: NA=not applicable; neg=negligible. Construction impacts are considered to be temporary, lasting only throughout the construction period. Impacts from operations would occur continuously.
Source: Table 4.2.4.4–1; Table 4.2.6.4–1; Table 4.3.1.4–1; Table 4.3.2.4–1; Table 4.3.4.2.4–1; Table 4.3.5.1.4–1.

The wastewater would be disposed to newly constructed sanitary, utility, and process wastewater treatment systems. The wastewater discharge would account for a 98-percent increase over the No Action Alternative projected discharge.

Idaho National Engineering Laboratory. Water requirements for the operation of the Preferred Alternative at INEL would be obtained from groundwater sources. The water requirements for the site over the projected No Action water usage would be a 2-percent increase for operations (approximately 9.6 percent of the groundwater allotment) and less than a 0.05-percent increase for construction (approximately 0.24 percent of the groundwater allotment).

The wastewater discharged during operations would be a 24-percent increase over the No Action projected discharge. Existing INEL treatment facilities could accommodate all the new Preferred Alternative processes and wastewater streams. However, if necessary, new sanitary, utility, and process wastewater treatment systems would be constructed.

Pantex Plant. Water requirements for the operation of the Preferred Alternative at Pantex would be obtained from groundwater resources or, if feasible, from the City of Amarillo Hollywood Road Wastewater Treatment Plant. Should only groundwater be used, the total annual site groundwater withdrawal, including the Preferred Alternative in the year 2005 (the No Action base year), would be 428 million l/yr (112 million gal/yr). This represents a 72-percent increase in the projected No Action usage. However, because the projected No Action

usage reflects reductions in water use due to planned downsizing over the next few years, this quantity (No Action plus the Preferred Alternative) is considerably less than what is currently being withdrawn at Pantex (836 million l/yr [221 million gal/yr]). Although Pantex's groundwater usage is expected to decline in the future, the site will still contribute to the declining water levels of the Ogallala Aquifer.

Total estimated wastewater discharge for the Preferred Alternative (283 million l/yr [74.7 million gal/yr]) at Pantex would result in a 100-percent increase in the No Action projected discharge. If necessary, new sanitary, utility, and process wastewater treatment systems would be constructed.

Savannah River Site. Water requirements during operation of the Preferred Alternative would be obtained from existing or new well fields at SRS. The Preferred Alternative water requirements for the site would be a 3.7-percent increase over projected No Action groundwater usage. Suitable groundwater from the deep aquifers at the site is abundant, and aquifer depletion is not a problem.

The Preferred Alternative wastewater discharge to the river would be less than 5 percent of the minimum flow of Fourmile Branch (0.16 m^3/s [5.7 ft^3/s]), and less than 0.003 percent of the Savannah River average flow (282 m^3/s [9,960 ft^3/s]). SRS treatment facilities could accommodate all the new processes and wastewater streams if a new facility is built for tritium supply and recycling operations as planned. However, if necessary, new sanitary, utility, and process wastewater treatment systems would be constructed.

Geology and Soils. The construction of the proposed facilities under the Preferred Alternative would involve some ground disturbing activities at Hanford, INEL, Pantex, and SRS. Ground disturbance increases the potential for soil erosion. The key factors affecting the erosion potential of a site are the amount of disturbed land and the amount of annual precipitation. The amount of land disturbed as a result of the Preferred Alternative facilities is shown in Table 4.6.1–3. The potential for soil erosion at Hanford, INEL, and Pantex is slight because of low precipitation. Since SRS receives more precipitation, the potential for erosion is considered moderate. The amount of soil loss would depend on the frequency and severity of precipitation events, wind velocities, and the size, location, and duration of soil disturbance.

During operation, improvements (buildings, roads, and landscaping) would considerably reduce the erosion potential. Erosion from stormwater runoff and wind could occasionally occur during operation of the facilities. Beyond increased erosion potential, no direct or indirect effects on geologic resources are anticipated. The construction and operation of the facilities and the site infrastructure improvements would not restrict access to potential geologic resources.

Biological Resources.

Hanford Site. Pu materials would continue to be stored at the PFP in the 200 West Area. There would be no impacts on biological resources anticipated. The pit disassembly/conversion, Pu conversion, ceramic immobilization, and MOX facilities would be constructed on vacant land in the 200 Area adjacent to 200 East. Construction of the four disposition facilities would affect animal populations. Less mobile animals within the project area, such as reptiles and small mammals, would not be expected to survive. Noise from construction and operation activities would cause larger mammals and birds in the construction area and adjacent areas to move to similar habitat nearby. If the area to which they moved were below its carrying capacity, these animals would be expected to survive. However, if the area were already supporting the maximum number of individuals, the additional animals would compete for limited resources, which could lead to habitat degradation and eventual loss of excess population. Nests and young animals living within the assumed sites may not survive. The sites would be surveyed as necessary for the nests of migratory birds before construction. Areas disturbed by construction, but not occupied by facility structures, would be of minimal value to wildlife because they would be maintained as landscaped areas.

Construction and operation of the four disposition facilities would not affect wetlands or aquatic resources since no wetlands or surface water bodies exist near the assumed facilities locations. During both construction and operation, water would be withdrawn from the Columbia River through an existing intake structure, and wastewater would be discharged to evaporation/infiltration ponds. Wetlands or aquatic resources bordering the river would not be affected because the volume of water included represents a small percentage of the flow of the river.

It is unlikely that federally listed threatened and endangered species would be affected by construction and operation of the four disposition facilities, but sagebrush habitat would be disturbed. The sagebrush community is an important nesting/breeding and foraging habitat for several State-listed and candidate species, such as the ferruginous hawk, loggerhead shrike, western burrowing owl, pygmy rabbit, western sage grouse, and sage thrasher. Pre-activity surveys would be conducted as appropriate before construction to determine the occurrence of plant species or animal species and habitat in the area to be disturbed. DOE would also consult with Federal and State agencies pursuant to the ESA and other statutes, as appropriate.

Idaho National Engineering Laboratory. Pu materials would continue to be stored at the ICPP and at ANL-W in the ZPPR and FMF vaults. There would be no impacts on biological resources anticipated. The pit disassembly/conversion and MOX facilities would be located on undeveloped land within or near the ICPP security area. The ICPP area falls within the big sagebrush/thickspike wheatgrass/needle-and-thread grass community. Construction of the two disposition facilities would affect animal populations. Less mobile animals within the project area, such as reptiles and small mammals, would not be expected to survive. Noise from construction and operation activities would cause larger mammals and birds in the construction area and adjacent areas to move to similar habitat nearby. If the area to which they moved were below its carrying capacity, these animals would be expected to survive. However, if the area were already supporting the maximum number of individuals, the additional animals would compete for limited resources, which could lead to habitat degradation and eventual loss of excess population. Nests and young animals living with the assumed sites may not survive. The sites would be surveyed as necessary for the nests of migratory birds before construction. Areas disturbed by construction, but not occupied by facility structures, would be of minimal value to wildlife because they would be maintained as landscaped areas.

Wetlands and aquatic resources associated with the nearest surface water body, the Big Lost River, are located 1.6 km (1 mi) from the facility location, so impacts are not expected there. Due to the lack of wetlands or aquatic resources at the assumed facility locations, these resources would not be affected by construction or operation of the two facilities.

It is unlikely that federally threatened or endangered species would be affected by construction of the two disposition facilities, but several State-listed species may be affected. Burrows and foraging habitat for the pygmy rabbit would be lost. Bat species such as the Townsend's western big-eared bat may roost in caves and forage through the assumed site. One State-listed sensitive plant species could potentially be affected by construction of the facility. The plant species, tree-like oxytheca, has been collected at eight sites on INEL and at only two other sites in Idaho. If present, individual plants of this species could be destroyed during land clearing activities. Preactivity surveys would be conducted as appropriate before construction to determine the occurrence of these species in the area to be disturbed. DOE would also consult with Federal and State agencies pursuant to the ESA and other statutes, as appropriate. No impacts to threatened and endangered species are expected due to facility operation.

Pantex Plant. Buildings 12-66 and 12-82 in Zone 12 South would be modified to accommodate the long-term storage of Pantex Pu material and RFETS pit Pu material. Upgrading the existing storage Pu storage facility at Pantex would cause minimal disturbance to biological resources because all activities, including some new construction, would take place within the developed area. Noise associated with construction could cause some temporary disturbance to wildlife, but this impact would be minimal since animals living adjacent to the developed area have already adapted to its presence. Impacts to wetlands and aquatic resources would not occur

since these resources are not found in the upgrade area. Since the upgrade would take place within a developed area, impacts to threatened and endangered species would not be expected.

Zone 12 is also the potential location for the pit disassembly/conversion facility. The MOX fuel fabrication facility would be located on undeveloped land in Zone 11, which lacks natural vegetation. Disturbance to wildlife would be limited due to the disturbed nature of the assumed locations; however, small mammals and some birds and reptiles could be displaced by construction. Since the area around both locations does not contain any wetlands or aquatic resources, these resources would not be affected by construction of the facility. During operation, wastewater would be discharged to site playas through NPDES-regulated outfalls. The additional wastewater could lead to minor increases in open water near the outfalls, as well as changes in plant species composition. It is unlikely that federally listed threatened or endangered species would be affected by construction or operation of the facilities. Although the assumed sites have been disturbed, it is possible that the State-listed Texas horned lizard could be present. Before construction, preactivity surveys would be conducted, as appropriate, to determine the presence of any special status species and habitat on the proposed site. DOE would also consult with Federal and State agencies pursuant to the ESA and other statutes, as appropriate.

Savannah River Site. The APSF in F-Area would be modified to accommodate the storage of RFETS non-pit Pu material in addition to SRS non-pit Pu material. There would be minimal additional impacts on biological resources anticipated with modifying the APSF in F-Area.

Vacant land in the F-Area would be used for the pit disassembly/conversion, Pu conversion, and ceramic immobilization facilities. Impacts to terrestrial resources would be minimal because the F-Area is one of the highly developed industrial areas of the SRS. Noise associated with construction could cause some temporary disturbance to wildlife, but this impact would be minimal since animals living adjacent to the F-Area have already adapted to similar disturbances. There would be no direct impacts to wetlands or aquatic resources from construction of the facility. Secondary impacts from stormwater runoff would be controlled by implementation of a soil erosion and sediment control plan. Operational impacts to wetlands and aquatic resources would be minimal since there would be relatively small increases in treated wastewater and stormwater that would be discharged via NPDES permitted outflows. Impacts from construction and operation of the three disposition facilities would not be expected to affect threatened and endangered species due to the developed nature of the assumed facility locations. Although suitable foraging habitat for the red-cockaded woodpecker exists in the area, the woodpecker colonies are located far enough from the facilities so that this species would not be directly affected by these facilities. Before committing construction resources, DOE would consult with Federal and State agencies pursuant to the ESA and other statutes, as appropriate.

The MOX fuel fabrication facility would be located on undeveloped land approximately 1.6 km (1 mi) north of the P-Reactor Area on the east side of SRS Route F. Construction of the MOX facility would affect animal populations. Less mobile animals within the project area, such as reptiles and small mammals, would not be expected to survive. Noise from construction and operation activities would cause larger mammals and birds in the construction area and adjacent areas to move to similar habitat nearby. If the area to which they moved were below its carrying capacity, these animals would be expected to survive. However, if the area were already supporting the maximum number of individuals, the additional animals would compete for limited resources which could lead to habitat degradation and eventual loss of excess population. Nests and young animals living with the assumed sites may not survive. The sites would be surveyed as necessary for the nests of migratory birds before construction. Areas disturbed by construction, but not occupied by facility structures, would be of minimal value to wildlife because they would be maintained as landscaped areas.

Since the majority of the assumed MOX fuel fabrication facility site is upland, the facility could be located to avoid direct impacts to wetlands. It would not be necessary to disturb wetlands along the site streams. Wastewater discharge from construction and operation would be minimal and would not be expected to affect wetlands associated with the receiving stream. Stormwater runoff during construction could cause temporary

water quality changes in local tributaries to Par Pond. During operation, nonhazardous wastewater would be discharged to local drainage channels. Flow increases are not expected to impact stream hydrology or aquatic resources. All discharges would be required to meet NPDES permit regulations.

It is unlikely that federally listed threatened or endangered species are expected to be affected by construction or operation of a MOX fuel fabrication facility. Although bald eagles have been sighted in the vicinity of the assumed facility location, it is highly unlikely that construction and operation of the MOX fuel fabrication facility would affect this species. Although suitable foraging habitat for the red cockaded woodpecker exists in the area, the woodpecker colonies are located far enough from the facilities so that this species would not be directly affected by the MOX facility, Before construction, preactivity surveys would be conducted as appropriate to determine the presence of any special status species and habitat on the proposed site. DOE would also consult with Federal and State agencies pursuant to the ESA and other statutes, as appropriate.

Cultural and Paleontological Resources. The potential impacts to cultural and paleontological resources are closely related to the amount of land disturbed. The land-use requirements associated with construction and operation of the Preferred Alternative actions at Hanford, INEL, Pantex, and SRS are shown in Table 4.6.1–3. Collocating the disposition facilities at a site would likely reduce the amount of land disturbed during construction and reduce the impacts to cultural and paleontological resources. In addition, optimal use of existing buildings and facilities would occur where possible. Because most of the locations proposed have been previously disturbed (except at SRS), it is unlikely that they would contain subsurface prehistoric or historic archaeological deposits. Some paleontological remains may be encountered during construction. Operations would not have additional impacts on historic, prehistoric, or paleontological resources, but there may be visual or auditory intrusions to Native American resources at some site. This section describes the impacts to cultural and paleontological resources of constructing and operating the storage and disposition facilities for each Preferred Alternative site.

Hanford Site. Pu materials would continue to be stored at the PFP in the 200 West Area. For the storage Preferred Alternative, there would be no anticipated impacts to cultural or paleontological resources. The pit disassembly/conversion, Pu conversion, ceramic immobilization, and MOX facilities would be located on vacant land in the 200 Area adjacent to 200 East. Although no archeological resources have been identified during surveys conducted in the adjacent 200 Areas, some may exist in the facility locations. Any such sites would be identified through compliance with Sections 106 and 110 of the NHPA. Any identified sites may be affected by facility construction. Operation would not result in additional impacts.

Although all of Hanford is considered sacred land by some Native American groups, no areas of great cultural significance have been identified close to the 200 Area. Resources may be identified through facility-specific consultation. Impacts from construction and operation may include reduced access to traditional use areas or visual or auditory intrusion into sacred or ceremonial space.

Pliocene and Pleistocene fossil remains have been discovered at Hanford. Although none have been recorded in the facility locations, they may exist. These resources may be affected by ground disturbing construction. Operations would not have additional impacts on paleontological resources.

Idaho National Engineering Laboratory. Pu materials would continue to be stored at the ICPP and the ZPPR and FMF vaults in ANL-W. For the storage Preferred Alternative, there would be no anticipated impacts to cultural or paleontological resources. The pit disassembly/conversion and MOX facilities would be located on undeveloped land within or near the ICPP security area. The pit disassembly/conversion facility would be sited in a location previously approved for the construction of the Special Isotope Separation Project. A surface survey of this area identified no prehistoric or historic sites. Although it is possible, the ICPP is unlikely to contain intact subsurface cultural deposits, due to prior ground disturbance and environmental setting. INEL has a contingency plan in place should any archeological remains be discovered during construction. Two historic sites occur adjacent to the ICPP—one historic can scatter across the Big Lost River to the northeast, and one

abandoned homestead to the east. The can scatter is not considered eligible for NRHP listing, and the homestead has been fenced off for protection. Construction and operation are not expected to affect either site.

Native American resources may be affected by the proposed facilities. Facility construction and operation may have visual or auditory impacts on traditional use areas or sacred sites. Resources may be identified through consultation with the interested tribes.

Some paleontological remains may be encountered during construction. The ICPP lies on alluvial gravels associated with the Big Lost River floodplain, which have produced fossilized remains. Operation would not have an effect on paleontological resources.

Pantex Plant. Buildings 12-66 and 12-82 in Zone 12 South would be modified to accommodate the long-term storage of Pantex Pu material and RFETS pit Pu material for the storage Preferred Alternative. These buildings are not considered NRHP eligible based on an evaluation of World War II Era structures at Pantex. However determinations of NRHP-eligible Cold War Era structures have not been completed, and some structures in Zone 12 may be determined eligible on that basis. Zone 12 is also the potential location for the pit disassembly/conversion facility. Because Zone 12 South is developed, disturbed, and removed from water sources, it is unlikely to contain subsurface prehistoric or historic archeological deposits, even on lands used for equipment laydown or construction parking. No impacts to prehistoric or historic resources are expected to result from the construction or operation of these facilities.

The MOX fuel fabrication facility would be located on undeveloped land in Zone 11. Areas that would be disturbed in Zone 11 have not been systemically surveyed for archaeological or paleontological resources. Before construction, additional survey work may be necessary under Section 106 of the NHPA. Because Zone 11 is disturbed, it is unlikely to contain subsurface prehistoric or historic archeological deposits. Should any subsurface remains be discovered during construction, appropriate mitigation, documentation, and/or preservation measures would be conducted as necessary. Operations would not have additional impacts to archeological resources as it does not result in additional ground disturbance. Facility construction may have an impact on historic structures at Pantex. The original buildings in Zone 11 were constructed between 1942 and 1945 to produce general purpose bombs. Zone 11 contains buildings, ramps, and landscape features that clearly illustrate the historic layout of a World War II bomb manufacturing line. Only two buildings within Zone 11 have been determined ineligible for listing on the NRHP. Construction may obscure the spatial relationship between these buildings, thereby compromising their historic significance. Operation of the facility is not expected to affect historic structures.

The Department has recently initiated consultation with Native American groups that have expressed interest in Pantex lands. To date, no Native American resources have been identified within Zones 11 and 12. Resources may be identified through additional consultation. Although no mortuary remains have been discovered at Pantex to date, it is possible that some exist within land to be disturbed by development. Burials are considered important Native American resources. Construction and operation could affect traditionally used plant and animal species.

The surficial geology of the Pantex area consists of silts, clays, and sands of the Blackwater Draw Formation. In other areas of the High Plains, this formation has produced Late Pleistocene vertebrate remains including woolly mammoth, bison, and camel, sometimes in context with archaeological remains. The land to be disturbed during construction may contain some fossilized remains. Operation would not have an affect on paleontological resources.

Savannah River Site. The APSF in F-Area would be modified to accommodate the storage of SRS non-pit Pu material and RFETS non-pit Pu material for the storage Preferred Alternative. Vacant land in the F-Area would be used for the pit disassembly/conversion, Pu conversion, and ceramic immobilization facilities. Portions of

the F-Area have been surveyed and contain sites potentially eligible for the NRHP. Additional surveys would be conducted in any unsurveyed areas to be disturbed by construction to comply with NHPA Sections 106 and 110. Site types known to occur at SRS include remains of prehistoric base camps, quarries, and workshops. Historic resources include remains of farmsteads, cemeteries, churches, and schools. Resources such as these may be affected by new facility construction, but not operation.

The MOX fuel fabrication facility would be located on undeveloped land approximately 1.6 km (1 mi) north of the P-Reactor Area on the east side of SRS Route F. To date, seven prehistoric sites have been located within 0.5 km (0.3 mi) of this area, so the potential for archaeological sites is moderate to high, and some NRHP-eligible resources may occur within the acreages that would be disturbed by construction. Prehistoric site types that may occur at SRS include villages, base camps, limited activity sites, quarries, and workshops. Historic site types that may occur at SRS include farmsteads, tenant dwellings, mills, plantations and slave quarters, rice farming dikes, cattle pens, dams, towns, churches, cemeteries, trash scatters, and roads.

Some Native American resources may be affected by construction and operation of the facilities. Resources such as prehistoric sites, cemeteries, isolated burials, and traditional plants could be affected by construction. Facility operation could result in reduced access to traditional use areas or sacred space. Visual or auditory intrusions to the areas may also result from the proposed facilities. These resources would be identified through consultation with the potentially affected tribes.

Some paleontological remains may occur on this acreage, but impacts during construction would be considered negligible because fossil assemblages known to occur at SRS are of low research value. No additional impacts are expected to paleontological resources during operation since no additional ground disturbance is expected.

Socioeconomics. The socioeconomic impact indicators associated with construction and operation of the Preferred Alternative actions at Hanford, INEL, Pantex, and SRS are shown in Table 4.6.1–7. The maximum impacts that could result from the operating of multiple storage and disposition facilities at one site are shown in the table. Although collocating multiple disposition facilities would likely lead to economies of scale, the ensuing analysis assumes that there would be no sharing of labor resources among the different operations. At all four sites the primary impact of the Preferred Alternative would be to increase regional employment and income. There would be some increase in demand for community services and housing at each of the sites as a result of in-migrating population. However, the available housing and existing community infrastructure would be able to accommodate these small population increases. Construction and operation of the proposed facilities would increase traffic flow and cause a potential decline in the level of service on some road segments at all sites except Hanford.

Table 4.6.1–7. Changes to Economic and Demographic Indicators for the Preferred Alternative (Full Operation)

Indicator	Hanford	INEL	Pantex	SRS
Change in ROI population	5,095	2,125	4,298	6,153
Percent change in ROI population	1.1	0.9	2.0	1.2
Change in REA employment	10,370	5,998	6,404	9,482
Percent change in REA employment	2.8	3.8	2.9	3.3
Change in REA per capita income	$464	$266	$94	$326
Percent change in REA per capita income	2.0	1.4	0.5	1.6

Source: Socio 1996a.

Hanford Site. Plutonium materials would continue to be stored at the PFP in the 200 West Area, and there would be no impact on the site workforce. However, under the Preferred Alternative, pit disassembly/conversion, Pu conversion, ceramic immobilization, and MOX facilities would also be located at Hanford. Construction of the various facilities would continue through the year 2013, and there would be sufficient available labor within the

region to fulfill construction workforce requirements. Economic impacts from construction would peak in 2010, during construction of the ceramic immobilization facility. Total REA employment would increase by 2,001 due to construction of the ceramic immobilization facility. However, during this same period, the other three disposition facilities would already be fully operational, generating an additional 7,467 jobs in the REA.

In 2003, the pit disassembly/conversion and MOX facilities would be the first disposition alternative facilities to become fully operational. Pu conversion would begin in 2006, and the ceramic immobilization operations would begin in 2013. The operational workforce would increase beginning in 2003 and peak in 2013 when all of the disposition facilities would become fully operational. Total direct employment would reach 3,073 in 2013. Total REA employment would increase by 10,370, and unemployment would decrease from 9.1 percent to 7.1 percent. The per capita income would increase by 2 percent. In-migration to fulfill specialized direct job requirements would lead to a population increase of about 1 percent in the ROI.

The additional population would increase the demand for community services by approximately 1 percent. A total of about 50 new teachers would be needed by 2013. Because the increase in demand would occur over a 10-year period and would be distributed over several school districts, there would be no significant impact on any single district. Thirteen additional police officers and seven firefighters would be needed to maintain No Action service levels. Six more doctors would be needed to maintain the projected No Action doctor-to-population ratio. In each case, the increase would be 1 percent or less over the No Action Alternative. Demand for housing would also increase, but the impact on the local markets would be minimal.

Construction and operation workers at Hanford would generate 1,920 and 5,900 additional vehicle trips per day on local roads, respectively. The level of service would not change due to the additional traffic generated during construction. Operations would cause a drop in level of service from B to C on Washington State Route 240 from Washington State Route 24 to Washington State Route 224.

Idaho National Engineering Laboratory. Plutonium material would continue to be stored at ICPP and ZPPR, and in FMF vaults at ANL-W. No additional workforce would be required for continuation of the storage mission at INEL. However, under the Preferred Alternatives, pit disassembly/conversion and MOX facilities would also be located at INEL. Construction of the two facilities would take place concurrently and continue through 2003. Some in-migration would take place both during construction and operation to fill specialized job requirements. Direct employment during peak construction would reach 660 in 1999 and total 1,330 during the first year of full operation in 2003. Total REA employment would increase by 1,192 during construction and by 5,998 during operations. Unemployment would decrease from 5.4 percent to 4.8 percent during peak construction and fall further to 2.4 percent during operation. The per capita income would increase by less than 0.4 percent during construction and by about 1.4 percent during operations.

In-migration to fulfill direct job requirements for both construction and operations would lead to a population increase of less than 1 percent in the ROI. The additional population would increase demand for community services by less than 1 percent during both construction and operations. A total of approximately 7 new teachers would be needed by 1999, and 29 by 2003. Because the increase in demand would occur over a multiyear period and would be distributed over several school districts, there would be no significant impact on any single district. One additional police officer and no firefighters would be needed during the construction phase to maintain the No Action service levels. During operations, five police officers and four firefighters would be needed. While one additional doctor would be required during construction, two doctors would be needed to maintain the No Action doctor-to-population ratio during full operation. In each case, the increase would be less than 1 percent over the No Action Alternative. Demand for housing would also increase, but, the impact on the local markets would be minimal.

Construction and operation workers at INEL would generate 1,267 and 2,554 additional vehicle trips per day on local roads, respectively. The level of service would not change due to the additional traffic generated during construction. Operations would cause a drop in level of service from D to E on US 20 from US 26/91 at Idaho

Falls to US 26 East. Operations would also cause a drop in level of service from B to C on US 20/26 from US 26 East to Idaho State Route 22/33.

Pantex Plant. Buildings 12-66 and 12-82 would be modified to accommodate the long-term storage of Pantex Pu material and RFETS pit Pu material for the storage Preferred Alternative. Additional workers would be required for construction and operation of the modified storage facilities. The Preferred Alternative would also involve locating pit disassembly/conversion and MOX fabrication facilities at Pantex. Construction of these two facilities would take place concurrently and continue through 2003, when full operations would commence. Because the construction of the disposition facilities would require a larger workforce than would modification of the storage facilities, peak construction impacts would occur in 1999. Peak operation impacts would occur in 2005, when all three facilities would be fully operational. Total direct construction employment during peak construction would reach 660 in 1999, and direct operation employment would reach 1,420 in 2005, when all three facilities would be fully operational. Total REA employment would increase by 1,192 during peak construction and by 6,404 during operations. Unemployment would decrease from 4.8 percent to 4.3 percent during peak construction and fall further to 3.0 percent during operations. The per capita income would increase about 0.3 percent during construction and by 0.5 percent during operations.

In-migration to fulfill direct job requirements for both construction and operations would lead to a population increase of 0.1 percent during construction and about 2 percent during operation. The increase in demand for community services during construction would be minimal. One additional teacher would be needed to maintain the No Action level of service. However, no additional police officers, firefighters, or doctors would be required during the construction phase. During operation, an additional 48 teachers would be required to maintain the No Action student-to-teacher ratio. Because the increased demand would occur over a multiyear period and would be distributed over several school districts, there would be no significant impact on any single district. Seven additional police officers and 10 firefighters would be needed to maintain No Action service levels. In addition, seven more doctors would be needed to maintain the No Action doctor-to-population ratio. These increases would average about 2 percent over the No Action Alternative. Demand for housing would also increase, but, the impact on the local markets would be minimal.

Construction and operation workers at Pantex would generate 1,267 and 2,726 additional vehicle trips per day on local roads, respectively. The level of service would not change due to the additional traffic generated during construction. Operations would cause a drop in level of service from A to B on Farm-to-Market 683 from U.S. 60 to Farm-to-Market 293 and on Farm-to-Market 2373 from I-40 to U.S. 60.

Savannah River Site. Under the Preferred Alternative, the Actinide Packaging and Storage Facility in the F-area would be modified to accommodate the long-term storage of the SRS non-pit Pu material and RFETS non-pit Pu material. The modification activities would employ workers from the current workforce, while operation of the expanded storage facility would require some additional workers. Under this alternative, pit disassembly/conversion, Pu conversion, MOX fuel fabrication, and the ceramic immobilization facilities would also be located at SRS. Construction of the various facilities would continue until 2013, when all of the facilities would become operational. There would be sufficient available labor in the region to fulfill the construction workforce requirements.

Economic impacts from construction would peak in 2010, during construction of the ceramic immobilization facility. Total REA employment would increase by 1,793 due to construction of the ceramic immobilization facility. However, during this same period, the other three disposition facilities would already be operating and generating an additional 6,936 jobs in the REA.

Peak economic impacts would occur in 2013, when all of the storage and disposition facilities would be fully operational. Total employment in the region would increase by 9,482, and unemployment would decrease to 4.5 percent. Regional per capita income would increase by about 1.6 percent.

Because of the demand for in-migrating workers to fill specialized employment requirements, the ROI population would increase by 0.9 percent. Demand for community services would also increase. To maintain the No Action student-to-teacher ratio, a total of 65 new teachers would have to be added to the ROI school districts, an increase of about 1 percent. Because the increase in demand for teachers would take place over a several years and affect several school districts, there would be minimal impact on any single school district.

The population increase would also result in the need for 18 police officers and 18 firefighters to maintain No Action service levels. In addition, 10 doctors would be required to maintain the No Action doctor-to-population ratio. In each case the increase would be about 1 percent or less. The increase in demand for housing would be too small to affect the market.

Construction and operation workers at SRS would generate 1,920 and 6,150 additional vehicle trips per day on local roads, respectively. Construction would cause a drop in level of service from E to F on South Carolina State Route 19 from U.S. 1/78 at Aiken to U.S. 278. Operations would not significantly impact local roads.

Public and Occupational Health and Safety. Tables 4.6.1–8 through 4.6.1–11 present the potential human health impacts from the radiological and hazardous chemical releases during facility normal operations and potential accidents associated with the combination of storage and disposition Preferred Alternative actions at each of the DOE sites.

Normal Operations. The human health impacts from the radiological and hazardous chemical releases during facility normal operations associated with the storage and disposition Preferred Alternative actions were analyzed at each of the DOE sites. The impact of the Preferred Alternative actions were then combined to obtain the "total impact." Total impact for each receptor/impact parameter is the summation of each facility, action, process, or technology for each of the operational campaigns (the number of years required to complete Pu disposition). Under normal radiological operations, the annual incremental dose to the MEI ranges from 2.7×10^{-4} mrem/yr at INEL to 4.1×10^{-3} mrem/yr at SRS. All doses, when added to No Action, are within the radiological limits specified in NESHAPS (40 CFR 61, Subpart H) and DOE Order 5400.5. The annual incremental dose to the population within 80 km (50 mi) from the Preferred Alternative ranges from 4.2×10^{-3} person-rem/yr at INEL to 0.22 person-rem/yr at SRS. For DOE activities, proposed 10 CFR 834 (See 58 FR 1628) would generally limit the potential annual population dose to 100 person-rem from all pathways combined, and would require an ALARA Program. When the contribution from the Preferred Alternative is combined with the No Action population dose for each of the sites, the total dose is well within the proposed 10 CFR 834. The dose assessments of the involved worker for storage and disposition facilities are within DOE radiological limits and administrative control levels. The incremental latent cancer fatalities to the involved workforce statistically estimated from these doses attributed to the Preferred Alternative range from 0.48 at INEL to 1.32 at SRS for the entire campaign (estimates based on the *1990 Recommendations of the International Commission of Radiological Protection*).

Facility Accidents. A set of potential accidents was postulated for each component of the Preferred Alternative. For each DOE site subject to multiple storage and disposition actions (Hanford, INEL, Pantex, and SRS), this includes a set of accidents for the storage option coupled with the combination of preferred disposition technologies assumed for the analysis. For the Existing LWR Alternative, a PRA approach was applied to determine the effects of operating an existing LWR with a MOX core. The incremental effects are described below.

One measure of impact calculated from modeled accident scenarios is expected risk, the summation of risk (the product of accident occurrence probability and consequence) for the accident spectrum modeled for each component of the Preferred Alternative. These expected risks were aggregated for the Preferred Alternative for the following impact receptors: a worker located 1,000 m (3,280 ft) from the accident release point; the maximum offsite individual located at the site boundary; and the population located within 80 km (50 mi) of the accident release point. Aggregated expected risk estimates of cancer fatality(s) for each assumed campaign under the Preferred Alternative range from: 1.3×10^{-6} at INEL to 1.5×10^{-5} at Pantex; 1.4×10^{-8} at INEL to

Table 4.6.1–9. Potential Human Health Impacts to the Public and Workers Under Normal Operation and Potential Accidents for the Preferred Alternative at Idaho National Engineering Laboratory

Receptor/Impact Parameter	Site No Action/ Reference Baseline (per 50 years of operation)[a,b]	Disposition Facility: Pit Disassembly/ Conversion (per 10-year campaign)[b]	Disposition Facility: MOX Fuel Fabrication (per 11-year campaign)[b]	Total Incremental Impact
Normal Operations				
Radiological Impacts				
MEI				
Annual dose (mrem/yr)	0.018	1.8×10^{-4}	8.8×10^{-5}	2.7×10^{-4}
Health effects (LCF risk)	4.4×10^{-7}	9.0×10^{-10}	4.9×10^{-10}	1.4×10^{-9}
Public Within 80 km				
Annual dose (person-rem/yr)	2.4	3.2×10^{-3}	9.7×10^{-4}	4.2×10^{-3}
Health effects (LCFs)	0.061	1.5×10^{-5}	5.4×10^{-6}	2.0×10^{-5}
Total Involved Workforce				
Health effects (LCFs)	4.4	0.34	0.14	0.48
Hazardous Chemical Impacts				
MEI				
Hazard index	1.5×10^{-2}	5.8×10^{-5}	7.1×10^{-5}	1.3×10^{-4}
Cancer risk	3.6×10^{-6}	0	0	0
Worker Onsite				
Hazard index	2.2×10^{-1}	5.1×10^{-4}	1.6×10^{-3}	2.1×10^{-3}
Cancer risk	7.7×10^{-4}	0	0	0
Facility Accidents				
MEI (LCF risk)	[c]	6.6×10^{-9}	7.1×10^{-9}	1.4×10^{-8}
Public within 80 km (LCF risk)	[c]	1.4×10^{-5}	1.6×10^{-5}	3.0×10^{-5}
Worker at 1,000 m (LCF risk)	[c]	6.1×10^{-7}	6.5×10^{-7}	1.3×10^{-6}

[a] The contribution from existing Pu storage is included in the site No Action total. A more detailed description of No Action impacts can be found in Section 4.2.3.9.

[b] Applies to health effects calculations for normal operations and facility accident risks.

[c] The safety to workers and the public from accidents at existing facilities is controlled by Technical Safety Requirements specified in a SAR or a Basis for Interim Operations document.

Note: LCF=latent cancer fatality; MEI=maximally exposed individual member of the public.

Source: Section 4.2.3.9; Section 4.3.1.9; Section 4.3.2.9; Section 4.3.4.1.9; Section 4.3.5.1.9.

6.0×10^{-6} at Pantex; and 3.0×10^{-5} at INEL to 9.1×10^{-4} at Pantex; respectively for these impact receptors. The Y–12 upgrade at ORR under the Preferred Alternative could reduce the expected risk of cancer fatalities for the design basis accidents analyzed in the Y–12 EA to 5.1×10^{-7}, 7.4×10^{-6}, and 5.7×10^{-8} per year for the 80-km (50-mi) offsite population, MEI, and noninvolved worker, respectively by meeting the performance goal for a moderate hazard facility of Performance Category 3 as prescribed in DOE Order 5480.28, *Natural Phenomena Hazards Mitigation*.

The evaluated accident scenario with the highest risk to the public at the DOE sites under the Preferred Alternative (a fire on the loading dock of the MOX fuel fabrication facility) would result in an estimated risk of 5.2×10^{-5}, 1.6×10^{-5}, 1.8×10^{-5}, and 5.2×10^{-5} cancer fatalities over the assumed MOX fuel fabrication campaign at Hanford, INEL, Pantex, and SRS, respectively.

Table 4.6.1–10. Potential Human Health Impacts to the Public and Workers Under Normal Operation and Potential Accidents for the Preferred Alternative at Pantex Plant

Receptor/Impact Parameter	No Action/ Reference Baseline (per 50 years of operation)[a]	Disposition Facility: Pantex Pu Storage Upgrade (per 50 years of operation)[a,b]	Disposition Facility: Pit Disassembly/ Conversion (per 10-year campaign)[a]	Disposition Facility: MOX Fuel Fabrication (per 11-year campaign)[a]	Total Incremental Impact
Normal Operations					
Radiological Impacts					
MEI					
Annual dose (mrem/yr)	6.1×10^{-5}	1.8×10^{-8}	1.1×10^{-3}	5.2×10^{-4}	1.6×10^{-3}
Health effects (LCF risk)	1.5×10^{-9}	4.5×10^{-13}	5.5×10^{-9}	2.9×10^{-9}	8.4×10^{-9}
Public Within 80 km					
Annual dose (person-rem/yr)	2.8×10^{-4}	6.3×10^{-6}	6.4×10^{-3}	2.8×10^{-3}	9.2×10^{-3}
Health effects (LCFs)	7.0×10^{-6}	1.6×10^{-7}	3.3×10^{-5}	1.6×10^{-5}	5.0×10^{-5}
Total Involved Workforce					
Health effects (LCFs)	0.68	0.12	0.34	0.14	0.6
Hazardous Chemical Impacts					
MEI					
Hazard index	5.7×10^{-3}	0	1.5×10^{-4}	1.9×10^{-4}	3.4×10^{-4}
Cancer risk	1.1×10^{-8}	0	0	0	0
Worker Onsite					
Hazard index	6.1×10^{-3}	0	2.6×10^{-4}	8.0×10^{-4}	1.0×10^{-3}
Cancer risk	4.5×10^{-7}	0	0	0	0
Facility Accidents					
MEI (LCF risk)	[c]	5.8×10^{-6}	1.0×10^{-7}	1.2×10^{-7}	6.0×10^{-6}
Public within 80 km (LCF risk)	[c]	8.8×10^{-4}	1.6×10^{-5}	1.8×10^{-5}	9.1×10^{-4}
Worker at 1,000 m (LCF risk)	[c]	1.4×10^{-5}	2.6×10^{-7}	2.9×10^{-7}	1.5×10^{-5}

[a] Applies to health effects calculations for normal operations and facility accident risks.

[b] The committed effective dose equivalent for the storage facility is calculated based upon analysis of measured dose.

[c] The safety to workers and the public from accidents at existing facilities is controlled by Technical Safety Requirements specified in a SAR or a Basis for Interim Operations document.

Note: LCF=latent cancer fatality; MEI=maximally exposed individual member of the public.

Source: Section 4.2.4.9; Section 4.3.1.9; Section 4.3.2.9; Section 4.3.4.1.9; Section 4.3.5.1.9.

Under the Preferred Alternative, the use of LWRs is being pursued for the disposition of surplus plutonium through the use of MOX fuel in place of UO_2. An important question is whether the use of MOX fuel changes the safety envelope of UO_2 fueled reactors documented in SARs, PRAs, and NUREG-1150 (*Severe Accident Risks: An Assessment for Five U.S. Nuclear Power Plants*). Related reactor safety issues are addressed in a recent report by the NAS (*Management and Disposition of Excess Weapons Plutonium Reactor-Related Options*). The report indicates that the potential influences on safety of the use of MOX fuel in LWRs has been extensively studied in the United States in the 1970s (*Final Generic Environmental Impact Statement on the Use of Recycled Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors*, NUREG-0002). These influences have also been extensively studied in Europe, Japan and Russia. Regarding effects of MOX on accident probabilities, the National Academy of Sciences report states, "... no important overall adverse impact of MOX use on the accident probabilities of the LWRs involved will occur; if there are adequate reactivity and thermal margins in the fuel, as licensing review should ensure, the main remaining determinants of accident probabilities will involve factors not related to fuel composition and hence unaffected by the use of MOX rather

than LEU fuel." Regarding the effects of MOX on accident consequences, the report states, "... it seems unlikely that the switch from uranium-based fuel could worsen the consequences of a postulated (and very improbable) severe accident in a LWR by more than 10 to 20 percent. The influence on the consequences of less severe accidents, which probably dominate the spectrum value of population exposure per reactor-year of operation would be even smaller, because less severe accidents are unlikely to mobilize any significant quantity of plutonium at all."

The incremental effects of utilizing MOX fuel in a commercial reactor in place of UO_2 were derived from a quantitative analysis of several typical severe accident scenarios for MOX and UO_2 using the MACCS computer code and generic population and meteorology data. The analysis only considers highly unlikely severe accidents where sufficient damage would occur to cause the release of Pu or uranium. The risks of severe accidents were found to be in the range of plus 8 to minus 7 percent, compared to UO_2 fuel, depending on the accident release scenario. The incremental risk of cancer fatalities to a generic offsite population located within 80 km (50 mi) of the severe accident release point would range from -2.0×10^{-4} to 3.0×10^{-5} per year for the accident release scenarios analyzed. Accidents severe enough to cause a release of Pu or uranium include combinations of events that are highly unlikely. Estimates and analyses presented in chapter 4 and summarized in Table 2.5–3 indicate a range of latent cancer fatalities and risk per year from 5.9×10^{3}/0.15 to 7.3×10^{3}/0.16. These preliminary results would be reexamined for licensing purposes and subsequent NEPA review. More detailed safety analyses would be performed using both up-to-date calculations of radionuclide inventories for different fuel compositions and irradiation histories, and population-exposure models for sensitivity changes in those inventories resulting from the use of weapons-grade Pu in the fuel.

Natural Phenomena. Under the Preferred Alternative, HEU would continue to be stored at Y–12 at ORR in existing facilities that would be upgraded. The majority of the HEU would be housed in upgraded facilities currently used for HEU storage. The remaining HEU would be stored in facilities that were formerly used for material processing but are currently being modified and converted into storage areas. Modifications to existing buildings would make the facilities suitable for long-term storage and consist primarily of those upgrades required to meet natural phenomena requirements (including earthquakes and tornadoes) as documented in *Natural Phenomena Upgrade of the Downsized/Consolidated Oak Ridge Uranium/Lithium Plant Facilities* (Y/EN-5080, 1994). The Y–12 storage buildings would be upgraded to meet the performance goal for a moderate hazard facility of Performance Category 3 in DOE Order 5480.28, *Natural Phenomena Hazards Mitigation*. In a Performance Category 3 facility, radioactive or toxic materials are present in significant quantities. Design considerations for this category are to limit facility damage so that hazardous materials can be controlled and confined, occupants can be protected, and functions of the facility can continue without interruption. A performance goal for Performance Category 3 is a hazard exceedance frequency of 1.0×10^{-4} per year (DOE Order 5480.28). Meeting this performance goal would reduce the expected risk for the design basis accidents analyzed in the Y–12 EA (for example, Building 9212) by approximately 80 percent, resulting in a latent cancer fatality risk of 5.1×10^{-7} to the MEI and 5.7×10^{-8} to a noninvolved worker, and potential latent cancer fatalities of 7.4×10^{-6} for the 80-km (50-mi) offsite population.

At SRS, F-Canyon facilities could be used for the immobilization of surplus Pu using the can-in-canister variant under the Preferred Alternative. The earthquake accident analysis in the *Environmental Impact Statement, Interim Management of Nuclear Materials* (IMNM EIS) determined that the F-Canyon facilities are structurally sound. Since that time, DOE has prepared a *Supplemental Analysis of Seismic Activity on F-Canyon* (August 1996). Based on the evaluation, an earthquake that could occur about once every 8,000 years could cause a level of structural damage to F-Canyon similar to the level of damage attributed to the earthquake considered in the IMNM EIS. Thus, the capability of F-Canyon to survive an earthquake more severe than that evaluated in the EIS, in combination with the fact that the likelihood of this level of damage was less than assumed in the EIS (1 per 8,000 years compared to 1 per 5,000 years), indicates that F-Canyon is seismically safe, or safer, than indicated in the IMNM EIS.

Waste Management. There is no spent nuclear fuel or HLW associated with construction or operation of Preferred Alternative facilities, but the ceramic immobilization facility would generate as its product output a stabilized ceramic form spiked with Cs radionuclides. (For immobilization using vitrification a stable glass form of Pu and HLW would be generated.) Storage of this immobilized product would be provided until disposal in a geologic repository pursuant to the NWPA. Pursuant to the NWPA, DOE is currently characterizing the Yucca Mountain Site as a potential repository for spent nuclear fuel and HLW. Legislative clarification, or a determination by the NRC that the immobilized Pu should be isolated as HLW, may be required before the material could be placed in Yucca Mountain should DOE and the President recommend, and Congress approve its operation. No radionuclides, which are RCRA wastes, would be used for immobilization so the immobilized product would be consistent with the repository's WAC. Each of the facilities under the Preferred Alternative has as part of its conceptual design waste management facilities that would treat and package all waste generated into forms that would enable staging and/or disposal in accordance with the regulatory requirements of RCRA, and other applicable statutes. Under the Preferred Alternative, the waste management infrastructure of the individual facilities would be integrated into a single waste management infrastructure to include maximum use of existing and planned site waste management facilities. Depending in part on decisions in the waste-type-specific RODs for the Waste Management PEIS, wastes could be treated, and (depending on the type of waste) disposed of onsite or at regionalized or centralized DOE sites. The treatment level and potential disposal of TRU and mixed-TRU waste at WIPP will depend on decisions in the ROD for the *Supplemental Environmental Impact Statement for the Waste Isolation Pilot Plant Disposal Phase*. For the purposes of analyses only, this PEIS assumes that TRU and mixed-TRU waste would be treated onsite to the current planning-basis WIPP WAC, and shipped to WIPP for disposal. This PEIS also assumes that hazardous waste LLW and mixed LLW would be treated and disposed of in accordance with current site practice.

Construction and operation of the proposed facilities would affect existing waste management activities at each of the sites analyzed, increasing the generation of TRU, low-level, mixed, hazardous, and nonhazardous wastes as shown in Table 4.6.1–12. Wastes generated during construction would consist of wastewater and hazardous and solid nonhazardous wastes. Wastewater and solid nonhazardous wastes would be disposed of as part of the construction project by the contractor, and the hazardous wastes would be treated onsite or shipped offsite, to a commercial RCRA-permitted treatment facility. After treatment, the waste would be disposed of offsite in a commercial RCRA-permitted disposal facility. No radioactive or hazardous soil contamination is expected to be generated during construction. However, if any were generated, it would be managed in accordance with site practice and all applicable Federal and State regulations.

Hanford Site. Under the Preferred Alternative approximately 78.2 m^3 (20,660 gal) of liquid and 750 m^3 (981 yd^3) of solid TRU waste would require treatment, and packaging to meet the current planning-basis WIPP WAC or an alternate treatment level. An estimated 200 m^3 (262 yd^3) of solid mixed TRU waste would be managed and treated as necessary in accordance with the Hanford Tri-Party Agreement to meet the WIPP WAC or an alternate treatment level. Depending on decisions made in the ROD for the *Supplemental Environmental Impact Statement for the Waste Isolation Pilot Plant Disposal Phase,* 109 additional truck shipments per year or, if applicable, 54 regular train shipments per year, or 18 dedicated train shipments per year would be required to transport the TRU and mixed TRU waste to WIPP.

Approximately 70.4 m^3 (18,590 gal) of liquid and 2,010 m^3 (2,630 yd^3) of solid LLW would require treatment, processing, and packaging to meet the WAC of the 200-Area LLW Burial Grounds. After treatment and volume reduction, 2,010 m^3 (2,630 yd^3) of solid LLW would require disposal. Assuming a land usage of factor of 3,400 m^3/ha (1,800 yd^3/acre), this would require 0.6 ha/yr (1.5 acres/yr) of LLW disposal area. The ultimate disposal of LLW will be in accordance with the ROD for the Waste Management PEIS.

Roughly 1.2 m^3 (320 gal) of liquid and 231 m^3 (302 yd^3) of solid mixed LLW would be treated and disposed of in accordance with the Hanford Tri-Party Agreement. The 46 m^3 (12,150 gal) of liquid and 184 m^3 (241 yd^3) of solid hazardous wastes would be collected, treated onsite or offsite, and shipped in Department of

Transportation (DOT)-approved containers to an offsite commercial RCRA-permitted treatment facility. After treatment, the waste would be disposed of offsite in commercial RCRA-permitted disposal facilities.

Approximately 177,000 m^3 (46.8 million gal) of liquid nonhazardous sanitary and industrial wastewater and 170,000 m^3 (45.0 million gal) of steam plant and cooling blowdown and estimated stormwater runoff would require treatment in accordance with site practice. Depending on actual site location, expansion of existing or construction of new sanitary, utility, and process wastewater treatment facilities may be required. The 3,240 m^3 (4,240 yd^3) of solid nonhazardous wastes that is not recycled or salvageable would be shipped to the City of Richland landfill per current site practice.

Idaho National Engineering Laboratory. Under the Preferred Alternative approximately 373 m^3 (488 yd^3) of solid TRU waste would require treatment and packaging to meet the current planning-basis WIPP WAC or an alternate treatment level. An estimated 8 m^3 (11 yd^3) of solid mixed TRU waste would be managed and treated as necessary in accordance with the INEL Site Treatment Plan to meet the current planning-basis WIPP WAC or an alternate treatment level. Depending on decisions made in the ROD for the *Supplemental Environmental Impact Statement for the Waste Isolation Pilot Plant Disposal Phase,* 44 additional truck shipments per year or, if applicable, 22 regular train shipments per year, or 7 dedicated train shipments per year would be required to transport the TRU and mixed TRU waste to WIPP.

Approximately 8 m^3 (2,000 gal) of liquid and 255 m^3 (333 yd^3) of solid LLW would require treatment, processing, and packaging to meet the WAC of the RWMC. Assuming a land usage of factor of 6,200 m^3/ha (3,300 yd^3/acre), the disposal of LLW would require 0.04 ha/yr (0.1 acres/yr) of LLW disposal area. The ultimate disposal of LLW will be in accordance with the ROD for the Waste Management PEIS.

Roughly 1.1 m^3 (290 gal) of liquid and 40 m^3 (52 yd^3) of solid mixed LLW would be treated and disposed of in accordance with the INEL Site Treatment Plan. The 6 m^3 (1,500 gal) of liquid and 154 m^3 (201 yd^3) of solid hazardous wastes would be collected, treated onsite or offsite, and shipped in DOT-approved containers to an offsite commercial RCRA-permitted treatment facility. After treatment, the waste would be disposed of offsite in commercial RCRA-permitted disposal facilities.

Approximately 129,000 m^3 (34.0 million gal) of liquid nonhazardous sanitary, industrial, and other process wastewater would require treatment in accordance with site practice. Depending on actual site location, expansion of existing or construction of new sanitary, utility, and process wastewater treatment facilities may be required. The 253 m^3 (331 yd^3) of solid nonhazardous wastes that is not recycled or salvageable would be shipped to the onsite landfill per current site practice.

Pantex Plant. Under the Preferred Alternative approximately 374 m^3 (489 yd^3) of solid TRU waste would require treatment and packaging to meet the current planning-basis WIPP WAC or an alternate treatment level. An estimated 8 m^3 (11 yd^3) of solid mixed TRU waste would be managed and treated as necessary in accordance with the *Pantex Plant Federal Facility Compliance Act Site Treatment Plan/Compliance Plan* to meet the WIPP WAC or an alternate treatment level. Depending on decisions made in the ROD for the *Supplemental Environmental Impact Statement for the Waste Isolation Pilot Plant Disposal Phase,* 44 additional truck shipments per year or, if applicable, 22 regular train shipments per year, or 7 dedicated train shipments per year would be required to transport the TRU and mixed TRU waste to WIPP.

Approximately 8 m^3 (2,100 gal) of liquid and 392 m^3 (513 yd^3) of solid LLW would require treatment, processing, and packaging to meet the WAC of the NTS Area 5 RWMS WAC. After treatment and volume reduction, 324 m^3 (424 yd^3) of solid LLW would require disposal. Assuming a land usage of factor of 6,000 m^3/ha (3,200 yd^3/acre), the disposal of LLW would require 0.05 ha/yr (0.13 acres/yr) of LLW disposal area at NTS. Assuming 16.6 m^3 (21.7 yd^3) of LLW per shipment, 20 additional LLW shipments per year from Pantex to NTS would be required. The ultimate disposal of LLW will be in accordance with the ROD for the Waste Management PEIS.

Roughly 1.3 m^3 (350 gal) of liquid and 48 m^3 (63 yd^3) of solid mixed LLW would be treated and disposed of in accordance with the *Pantex Plant Federal Facility Compliance Act Site Treatment Plan/Compliance Plan*. The 7 m^3 (1,760 gal) of liquid and 155 m^3 (203 yd^3) of solid hazardous wastes would be collected, treated onsite or offsite, and shipped in DOT-approved containers to an offsite commercial RCRA-permitted treatment facility. After treatment, the waste would be disposed of offsite in commercial RCRA-permitted disposal facilities.

Approximately 141,000 m^3 (37.2 million gal) of liquid nonhazardous sanitary, industrial, and other process wastewater would require treatment in accordance with site practice. Depending on site location, expansion of existing or construction of new utility and process wastewater treatment facilities may be required. The existing sanitary wastewater treatment system has adequate excess capacity to treat the additional quantity of sanitary wastewater. The 391 m^3 (511 yd^3) of solid nonhazardous wastes that is not recycled or salvageable would be shipped to the City of Amarillo landfill under current site practice.

Savannah River Site. Under the Preferred Alternative approximately 78.2 m^3 (20,660 gal) of liquid and 750 m^3 (981 yd^3) of solid TRU waste would require treatment and packaging to meet the current planning-basis WIPP WAC or an alternate treatment level. An estimated 200 m^3 (262 yd^3) of solid mixed TRU waste would be managed and treated as necessary in accordance with the SRS Treatment Plan to meet the current planning-basis WIPP WAC or an alternate treatment level. Depending on decisions made in the ROD for the *Supplemental Environmental Impact Statement for the Waste Isolation Pilot Plant Disposal Phase,* 109 additional truck shipments per year or, if applicable, 54 regular train shipments per year, or 18 dedicated train shipments per year would be required to transport the TRU and mixed TRU waste to WIPP.

Approximately 70.4 m^3 (18,600 gal) of liquid and 2,010 m^3 (2,630 yd^3) of solid LLW would require treatment, processing, and packaging to meet the WAC of the SRS E-Area Low-Level Radioactive Disposal Facility. After treatment and volume reduction, 2,010 m^3 (2,630 yd^3) of solid LLW would require disposal. Assuming a land usage of factor of 8,600 m^3/ha (4,600 yd^3/acre), this would require 0.2 ha/yr (0.5 acres/yr) of LLW disposal area. The ultimate disposal of LLW will be in accordance with the ROD for the Waste Management PEIS.

Roughly 1.2 m^3 (311 gal) of liquid and 231 m^3 (302 yd^3) of solid mixed LLW would be treated and disposed of in accordance with the SRS Site Treatment Plan. The 46 m^3 (12,070 gal) of liquid and 184 m^3 (241 yd^3) of solid hazardous wastes would be collected, treated onsite or offsite, and shipped in DOT-approved containers to an offsite commercial RCRA-permitted treatment facility. After treatment, the waste would be disposed of offsite in commercial RCRA-permitted disposal facilities.

Approximately 179,000 m^3 (47.3 million gal) of liquid nonhazardous sanitary and industrial wastewater and 170,000 m^3 (45 million gal) of steam plant and cooling blowdown and estimated stormwater runoff would require treatment in accordance with site practice. Depending on actual site location, expansion of existing or construction of new utility and process wastewater treatment facilities may be required. The centralized sanitary wastewater treatment system is adequate to treat the sanitary portion. The 3,250 m^3 (4,250 yd^3) of solid nonhazardous wastes that is not recycled or salvageable would be shipped to an offsite landfill per current site practice.

Intersite Transportation. A summary of the estimated health effects from transportation of radiological materials for the Preferred Alternative actions at Hanford, INEL, Pantex, and SRS if all the applicable Preferred Alternative disposition facilities were located at a single site is shown in Table 4.6.1–13. If the disposition facilities are at multiple sites then the health effects would be larger, as described below. For the storage Preferred Alternative, there would be no additional transportation of Pu to Hanford and INEL and therefore, no potential fatalities at those sites. Pits from RFETS would be transported to Pantex, and non-pit Pu material from RFETS would be transported to SRS. Pits to be transferred would be packaged in FL (Type B) containers at RFETS before shipment and, upon receipt at Pantex, would be repackaged into AL-R8 containers in Zone 12 South and placed into storage in Zone 4 West pending availability of AT-400A containers and relocation to

Table 4.6.1–13. Total Potential Fatalities[a] From the Transportation of Materials for the Preferred Alternative

Activity	Hanford	INEL	Pantex	SRS
Storage	0.0	0.0	0.006	0.060
Pit disassembly/conversion	0.209	0.161	0.0	0.184
Pu conversion	[b]	NA	NA	[b]
MOX fuel fabrication	0.193	0.193	0.193	0.193
Ceramic immobilization	0.98	NA	NA	1.43
Total if disposition activities are one site	1.382	0.354	0.199	1.867

[a] Resulting from both radiological and nonradiological risks for the life of the project.
[b] The analysis assumed that the Pu conversion facility would be located at the immobilization site.
Note: NA = not analyzed for the Preferred Alternative.
Source: Table 4.4.3.2-1; Table 4.4.3.3-1; Table 4.4.3.3-3; Table 4.4.3.3-4.

upgraded storage facilities in Zone 12 South. The transportation of pits between Zone 4 and Zone 12 and the repackaging of the pits from AL-R8 to AT-400A containers is analyzed in the Pantex EIS.

For the disposition alternative, the transportation analysis was based upon the assumption that the storage Preferred Alternative had been implemented prior to the start disposition transportation.

Further, the reactor portion of the disposition Preferred Alternative assumed that the pit disassembly/conversion facility and the MOX facility could be sited at one location or sited at different locations. The total potential fatalities could range from 0.193 (the pit disassembly/conversion and MOX facilities at Pantex) to 0.761 (the pit disassembly/conversion and MOX facilities at different sites). In addition to the DOE sites, there would be transportation of the MOX fuel from the DOE site to existing reactors. The destination of the MOX fuel could be either the eastern or western United States. Assuming 4,000 km (2,484 mi), there would be an additional 3.61 potential fatalities.

For the immobilization portion of the disposition Preferred Alternative, the analysis assumed that the Pu conversion and ceramic immobilization facility would be at the same location. The total potential fatalities could range from 0.98 (both facilities at Hanford) to 1.43 (both facilities at SRS). The analysis includes the effect of transporting Cs-137 to the immobilization site and the transportation of immobilized materials to a HLW repository site. The ceramic immobilization facility was selected for this analysis because the transportation impacts were slightly greater that the vitrification facility.

Environmental Justice. The public health and safety analyses show that air emissions and hazardous chemical and radiological releases from normal operations for all of the storage alternatives would be within regulatory limits and that no latent cancer fatalities would result. Because no populations within 80 km (58 mi) of the proposed site would experience high or adverse health or environmental impacts, neither minority populations nor low-income populations would experience disproportionate high and adverse human health or environmental impacts.

The public health and safety analyses also indicate that radiological releases from accidents would not result in significant adverse human health or environmental impacts. Therefore, such accidents would not have disproportionately high and adverse impacts on minority or low-income populations. Potential transportation accidents would be random events along the transportation corridors, therefore, such accidents would not disproportionately impact minority or low income populations.